

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

BMD3024 – MULTIVARIATE DATA ANALYSIS

(All sections / Groups)

12 OCTOBER 2016

2.30 p.m. - 4.30 p.m.

(2 Hours)

INSTRUCTIONS TO STUDENTS

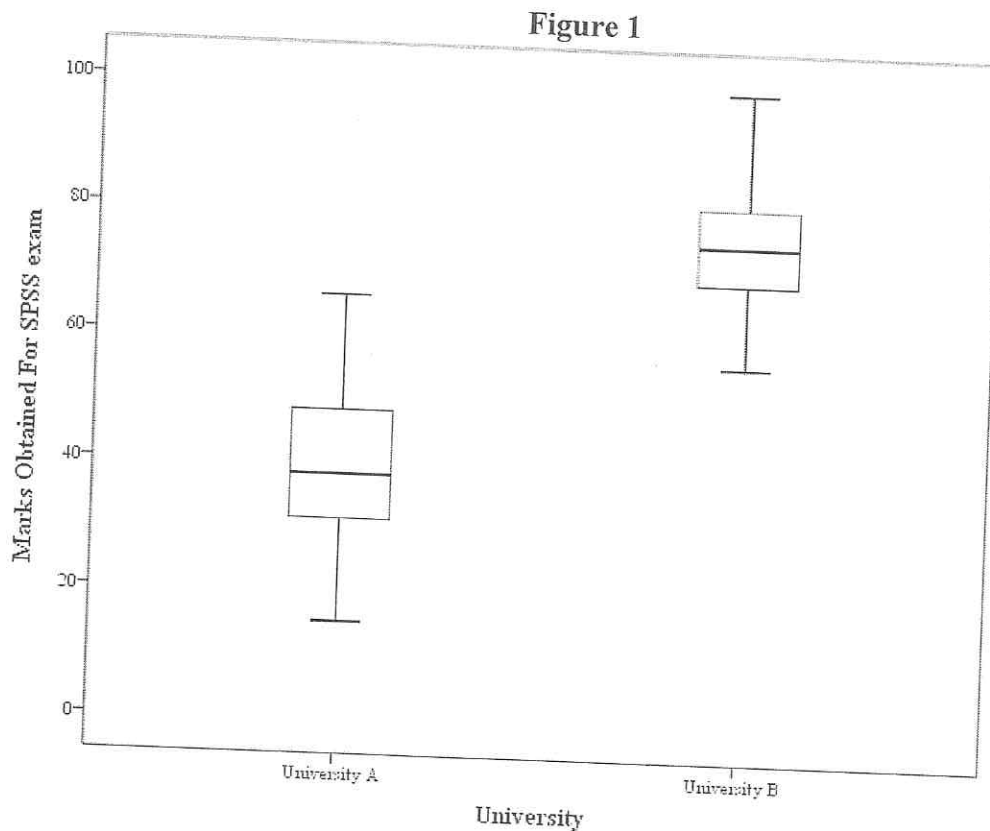
1. This question paper consists of **SIX (6)** printed pages with **FOUR (4)** structured questions.
2. Marks are shown at the end of each question.
3. Write all your answers in the answer booklet provided.
4. Answer **ALL** questions.

Question One (25 marks)

- (a) Describe the **three (3)** determinants of the **power** of a statistical test. (6 marks)
- (b) List **three (3)** ways **normality** assumptions can be checked. (3 marks)
- (c) In running **multiple regression**, what are the methods researchers can use to select variables to be included in the model? (15 marks)

Question Two (25 marks)

- (a) Differentiate between ordinal and disordinal interactions in MANOVA. (10 marks)
- (b) List the **five (5)** types of agglomerative algorithms used in Cluster Analysis. (5 marks)
- (c) **Figure 1** is the Box & Whiskers Plot for the marks obtained for an SPSS exam by students from University A and University B. Analyse **Figure 1**. (10 marks)

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Question Three (25 marks)

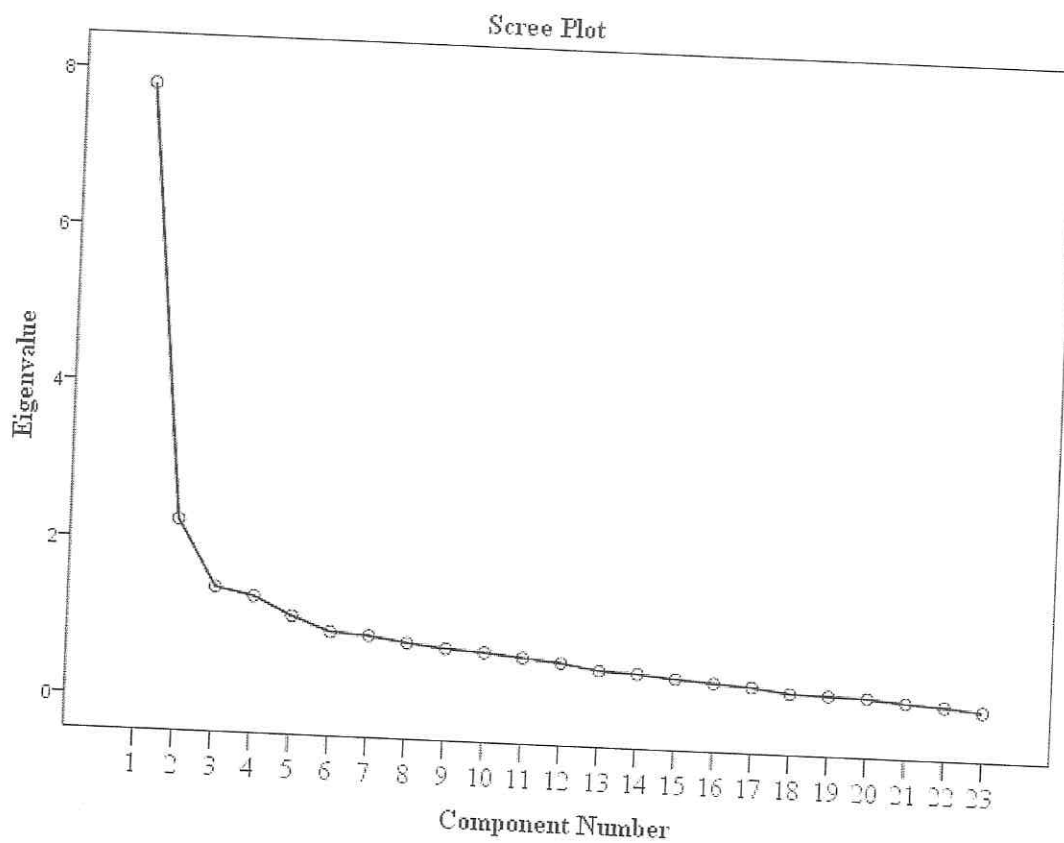
- (a) A researcher devised a questionnaire to measure organizational ability. She predicted X number of factors to do with organizational ability. These dimensions are theoretically independent. The questionnaire contains 28 items using a 7-point Likert scale (1 = strongly disagree, 4 = neither, 7 = strongly agree). She gave it to 239 people. Exploratory Factor Analysis was conducted on the data collected.

Table 1 and **Figure 2** are the SPSS output of the exploratory factor analysis.

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.810	33.955	33.955	7.810	33.955	33.955	4.643	20.185	20.185
2	2.251	9.787	43.742	2.251	9.787	43.742	3.254	14.148	34.333
3	1.404	6.105	49.847	1.404	6.105	49.847	2.605	11.326	45.659
4	1.303	5.666	55.513	1.303	5.666	55.513	1.730	7.522	53.182
5	1.066	4.636	60.148	1.066	4.636	60.148	1.602	6.966	60.148
6	.884	3.842	63.991						
7	.854	3.713	67.704						
...	...	...	...						
...	...	...	...						
...	...	...	...						

Continued...

Figure 2



- (i) Based on **Table 1**, use the latent root criterion of retaining factors to determine and explain how many factors will be retained. (4 marks)
- (ii) Based on **Figure 2** use the Scree Test criterion of retaining factors to determine and explain how many factors will be retained. (4 marks)
- (iii) Based on your results in (i) and (ii), explain how many factors will be retained. (2 marks)

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- (b) A group of researchers wanted to determine what variables determine a person's current salary (*salary*). The variables studied are months of previous work experience (*prevexp*) length of time working in current job in months (*jobtime*), beginning salary (*salbegin*) and years of education obtained (*educ*). They ran a multiple regression on SPSS and obtained the following results in **Tables 2 to 4**.

- (i) **Table 2** shows the 'Model Summary' of the multiple regression.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.900 ^a	.810	.809	\$7,465.139

a. Predictors: (Constant), *prevexp*, *jobtime*, *salbegin*, *educ*

Interpret **Table 2**.

(2 marks)

- (ii) **Table 3** shows the ANOVA results of the multiple regression from (a)(i).

Table 3: ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	111779919524.266	4	27944979881.067	501.450	.000 ^b
	Residual	26136575912.073	469	55728306.849		
	Total	137916495436.340	473			

a. Dependent Variable: salary

b. Predictors: (Constant), *prevexp*, *jobtime*, *salbegin*, *educ*

Interpret **Table 3**.

(2 marks)

Continued...

- (iii) Table 4 shows the coefficients of the multiple regression from (a)(i).

Table 4: Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-16149.671	3255.470		-4.961	.000
	<i>educ</i>	669.914	165.596	.113	4.045	.000
	<i>salbegin</i>	1.768	.059	.815	30.111	.000
	<i>jobtime</i>	161.486	34.246	.095	4.715	.000
	<i>prevexp</i>	-17.303	3.528	-.106	-4.904	.000

a. Dependent Variable: *salary*

Interpret Table 4 in detail.

(7 marks)

- (iv) Use Table 5 (the descriptive statistics for the variables *prevexp* and *salary*) below to explain the reasons for the negative coefficient of the *prevexp*, i.e. why is there a negative relationship between months of previous work experience and salary?

(4 marks)

Table 5: Descriptive Statistics

		<i>prevexp</i>	<i>salary</i>
N	Valid	474	474
	Missing	0	0
Mean		95.86	\$34,419.57
Median		55.00	\$28,875.00
Mode		0	\$30,750
Std. Deviation		104.586	\$17,075.661
Skewness		1.510	2.125
Kurtosis		1.696	5.378

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Question Four (25 marks)

A questionnaire with 23 questions (items) was designed to predict how anxious a given individual would be about learning how to use SPSS.

Four (4) factors have been identified - *Computer-Related Anxiety (CRA)*; *Statistics-Related Anxiety (SRA)*, *Past Experience-Related Anxiety (PERA)*, and *Peer Pressure-Related Anxiety (PPRA)*.

Computer-Related Anxiety (CRA) is made up of six items (variables).

Statistics-Related Anxiety (SRA) is made up of six items (variables).

Past Experience-Related Anxiety (PERA) is made up of five items (variables).

Peer Pressure-Related Anxiety (PPRA) is made up of six items (variables).

Draw one (1) path diagram that shows the following hypothesized structural relationships amongst **four (4)** factors – *Computer-Related Anxiety (CRA)*; *Statistics-Related Anxiety (SRA)*, *Past Experience-Related Anxiety (PERA)*, and *Peer Pressure-Related Anxiety (PPRA)*.

H₁: *Computer-Related Anxiety (CRA)* is correlated to *Past-Experience-Related Anxiety (PERA)*.

H₂: *Statistics-Related Anxiety (SRA)* is correlated to *Peer-Pleasure-Related Anxiety (PPRA)*.

Label all variables and factors as well as their H₁ and H₂ relationships in the diagram.

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